



## **WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID:** 2005SD38B

**Title:** Fate of Disinfectants and Disinfection By-Products in Water Distribution Systems

**Project Type:** Research

**Focus Categories:** Water Supply, Water Quality, Treatment

**Keywords:** disinfection by-products, water distribution, Stage 2 D/DBP Rule

**Start Date:** 03/01/2005

**End Date:** 02/28/2006

**Federal Funds:** \$18,890

**Non-Federal Matching Funds:** \$37,808

**Congressional District:** First

**Principal Investigator:**  
Delvin Edward DeBoer

### **Abstract**

South Dakota water systems use chloramine, free chlorine and chlorine dioxide as chemical disinfectants. They distribute water into systems of PVC and ductile iron pipes arranged in looped (municipal) and extensively branched (rural water) networks, containing storage tanks and booster disinfection systems. These system characteristics, along with water age and temperature, are primary factors affecting disinfectant residual decay and disinfection by-product (DBP) formation in these systems. While trihalomethanes (THMs) have been shown to increase with water age, haloacetic acids (HAAs) have been found to increase to a point in the distribution system, but then decrease, especially in areas of low disinfectant residual. Since water quality tends to have characteristics related to the hydrogeology of the water source, DBP formation in distribution systems tends to be region-specific.

The objectives of this project are to more fully understand the behavior of chlorine and disinfection by-products in distribution systems in the upper great plains region, and develop correlations between the characteristics of distribution systems and chlorine decay and DBP production. Results of the project can be used by water systems to assess the locations where water samples should be collected that will provide the maximum

DBP concentration as required by the proposed Stage 2 Disinfectant/Disinfection By-Product Rule.

The project will be accomplished by obtaining characteristic data from 5 water distribution systems in South Dakota that represent a range of disinfectant types, system size, and pipe materials. Correlations developed from the characteristic data will be used to predict the locations of maximum chlorine decay and DBP formation. Samples collected at these locations will be analyzed for DBP concentrations, the results of which will then be also correlated with system characteristics to develop relationships that can extend to other distribution systems.